



**Cooperative Environmental Assistance Bureau
In the Division of Customer Assistance and External Relations**

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Getting Started in Aquaculture:

Environmental Concerns and Regulations

The abundance of clean water in Wisconsin makes it a good place to raise fish. Since everyone needs clean water, it is important to manage this natural resource and keep it clean so all of us can enjoy it. The construction of ponds and other types of aquaculture structures must be carefully planned to take advantage of the natural site conditions and to minimize the environmental impacts of the project. Likewise, the source of water and the discharge point for the used water must be carefully evaluated to determine what will work best at your site.

This summary is intended to guide new fish farmers on selecting a site and evaluating their site, to design an aquaculture system that minimizes environmental impacts. It contains information about various types of aquaculture systems, and a description of regulatory requirements and DNR permits that may be needed. An aquaculture facility that is properly designed for its site will require fewer environmental permits, and those that are required should be easier to obtain.

Note that all aquaculture facilities must be registered by the Department of Agriculture Trade and Consumer Protection (DATCP). DATCP also regulates fish health and the importation of fish from other states.

A. Types of Aquaculture Systems

There are three basic types of systems; some aquaculture facilities will have variations of each.

1. Flow-through systems. When there is an abundant and easy to harness supply of clean water, a concrete raceway or earthen pond is constructed such that the constant flow of water creates a favorable place to raise fish. Generally the source of water is a spring or artesian well and cold water species, such as trout, are raised. Fish waste is collected in the raceway or pond and periodically removed. Flow-through systems require a receiving stream that has adequate flow to assimilate the discharge without changing the water quality of the stream.

2. Pond Systems. A typical use of pond systems is in growing warm water species from fry to fingerlings. The ponds are initially filled with water and fertilized to create a natural growth of aquatic organisms to provide a natural food source for the fry. With low fish densities, they can grow for a whole season with natural aeration and some supplemental feeding. Higher densities of fish may require mechanical aeration, supplemental feeding, and a supplemental flow-through water source. Pond systems are often used on sites where water supply and/or water discharge volumes are limited. Ponds require more land area and should not be constructed in wetlands.

3. Recirculating Systems. The advantage of recirculating systems is that a high density of fish can be kept at optimum temperatures by removing the fish waste and reusing the water. The rate of

growth is usually faster and the system can be covered to protect the fish from predators. For sites with limited water supply, limited discharge opportunities or limited land area, recirculating systems may be the best alternative. However, technology for effective and reliable waste treatment systems to clean the water for reuse is more expensive and not totally reliable.

B. Water supply

1. Groundwater aquifer. In many parts of Wisconsin the best source of cool clean water is from a well. Select a site with the groundwater table near the surface to reduce pumping cost. A high capacity well permit is required if you plan to pump more than 70 gallons per minute. This permit is easy to obtain, provided that pumping from your well does not draw water away from any municipal well.

2. Surface water supply. You may withdraw of up to 2 million gallon per day (MGD) of surplus flow from a navigable lake or stream without a permit, as long as the withdrawal does not injure any public rights in that waterway. For large streams with good water flow this may be feasible, however you will need a chapter 30 structure permit if you need to construct a permanent intake structure in the waterway. If you need more than the surplus flow or plan to withdraw more than 2 MGD, you must obtain a chapter 30 diversion permit and obtain consent of all downstream waterfront owners that may be adversely affected. If you propose to construct a dam in order to create a pond to withdraw water for your fish farm, a chapter 31 permit is required. Dam permits require extensive review to evaluate impacts to fish and aquatic life as well as neighbors upstream and downstream.

C. Water Discharge

Ideally, an aquaculture site will be able to discharge to a receiving stream that has adequate flow to assimilate the discharge without changing the water quality of the stream. Small streams have less ability to assimilate pollutants and temperature changes that can result from fish farm discharges. Discharge to streams classified as “exceptional” or “outstanding resource waters” will have to be as clean as the stream water. Discharge requirements for trout streams are also very restrictive, to prevent pollution including increased heat. Exceptional and outstanding resource waters are listed on the web at www.dnr.state.wi.us/org/water/wm/glwsp/.

1. Pollutants in the Discharge. The most common pollutant from fish farms is solid particles of fish waste. Fish waste adds phosphorus and nitrogen to a stream, and as fish waste decomposes in receiving streams, it can use up the dissolved oxygen that wild fish and aquatic life depends on. All aquaculture systems should be designed to incorporate best management practices that will collect all settleable solids prior to discharge. The design should also minimize the difference in water temperature between the discharge water and the receiving stream.

2. Discharge permits. Current federal and state rules require a Wisconsin Pollutant Discharge Elimination System (WPDES) permit only for large fish farms. Farms producing less than 20,000 pound per year of cold water species, 100,000 pounds per year of warm water species or using less than 5000 pounds of feed per month for cold water species are exempt. However any size fish farm can be required to apply for a WPDES permit if they are identified as a “significant source of pollution”. For example, a fish farm could be identified as a significant source of pollution if it discharges more organic waste than the receiving stream can assimilate, or if high levels of discharged phosphorus cause algae blooms in the receiving stream. Always design for and

implement best management practices to minimize pollutants in your discharge, and reduce the likelihood that your facility will be identified as a significant source of pollution. If you are required to obtain a WPDES permit, periodic sampling and analyzing of discharge water and reporting of test results will be required.

D. Building ponds and/or structures

The construction of ponds has historically been a popular way to create a place for fish farming. In many cases, DNR permits are required for this construction.

1. Construction in Uplands. The following activities will require a DNR “chapter 30 permit”:

- “Unconnected” Ponds within 500 feet of a public navigable waterway
- Ponds with open or closed outlets to public navigable waters, even if the pond is greater than 500 feet from the waterway
- Ponds connected by a open navigable channel to an existing public navigable waterway, or any enlargement of any public navigable waterway – Note, these types of ponds are required by law to be designated public waters, and fish farming cannot be permitted (see “E” below).

Grading in excess of 10,000 square feet (1/4 acre) on the bank of a public navigable waterway also requires a chapter 30 permit. This could include concrete tanks and other in-ground structures if they are installed near a waterway and require land disturbance more than 1/4 acre during construction or installation.

2. Construction in wetlands. Wetlands are not a desirable location for fish farm ponds, due to the high level of nutrients and resulting excessive weed growth. In addition, fish farming in wetland ponds is limited by the “natural water body” permit requirements (see “E” below). DNR occasionally approves construction of wetland ponds, if the landowner can show that there are no other alternatives, and that the quality of the wetland will not be harmed. Pond construction in a high quality wetland will not be permitted. In some cases, a landowner may not be aware that they have wetlands on their property, especially if the area has been cultivated. If you are planning a fish farm, do a thorough soil and groundwater site review of your site. Although the site may look like a field, if it has poorly drained soils and water close enough to the surface to support wetland plants, it is probably a wetland. Various wetland maps are also available.

E. Using an existing pond

New fish farmers often have an existing pond on their property that they’d like to use for fish rearing. If your existing pond meets the legal definition of a “natural body of water”, you may not be able to use it as a fish farm unless you can meet several important requirements. A “natural body of water” is a spring, stream, pond, lake or wetland that was historically present in a natural state, even though it may have been physically altered over time. A permit is required to use a natural waterbody for a new fish farm, and these NR 16 permits can only be issued for shallow ponds (generally less than 5 feet deep) that freeze-out 2 out of 5 years. Also you must lease or own all the land around the pond so that no public access is provided. If you have a natural waterbody on your property that doesn't meet statutory requirements, it cannot be legally operated as a fish farm. These deeper ponds can be stocked and used as a private fishing pond, but a DNR stocking permit is required, and all fishing activities must comply with all state fishing regulations including seasons, minimum sizes, bag limits and a fishing license is required.

F. Alternatives to surface water discharge

If you are interested in developing a fish farm operation but your site has some limitations due to discharge, here are some design and management alternatives to consider:

- Minimize the volume of water discharged by removing solids and re-aerating the water for partial recycle.
- When cleaning raceways or draining ponds, discharge the dirtiest water to another pond for settling.
- In a pond system where the ponds are periodically drained, an extra pond can be constructed to minimize, and possibly eliminate, discharge to surface water.
- Consider land application for sites that have surface discharge restrictions. For example, when draining a pond you could pump and irrigate the water onto cropland. DNR may approve and issue WPDES permits to properly designed land application systems such as spray irrigation, land spreading, furrow irrigation and absorption ponds.
- Fish wastes are a good fertilizer that can be sold or given away when dewatered. For recirculation systems the watery sludge removed from the treatment system could be directly landspread as fertilizer.

G. Selecting a Site and Design

- Look for a shallow high capacity aquifer that is not close to a municipal well or an irrigated crop field
- Look for a stream with significant flow and a warmwater sport fishery classification. Avoid trout streams and outstanding or exceptional resource waters.
- Build ponds and structures in an upland area away from wetlands and existing waterways.
- Use pipes for water discharge (and intake if used) to avoid constructed open channels being considered public navigable waterways
- Design discharge structures (and intake if used) so that they do not obstruct flow or navigation in the receiving stream
- Control soil erosion during any earth-moving activity using best management practices, to keep the soil in place instead of capturing it after it starts to erode. Clear the minimum area necessary for where you are working, and stabilize each finished area (or where its idle for several days) with mulch and a fast growing cover crop.
- Develop a plan for managing fish waste and incorporate the components into your design.
- If fish processing is part of the facility, be sure to design a system for handling process wastewater and the inedible fish parts.

For more information about Environmental Permits for Fish Farming, contact Jerry Rodenberg, Aquaculture Sector Specialist (608-266-7715) or the DNR Fish Farm Environmental Permit Coordinator for the county where your property is located. Names and telephone numbers of DNR's Environmental Permit Coordinators are available on DNR's website at

<http://dnr.wi.gov/org/water/fhp/fish/aquaculture/envperm.htm> A copy of this publication is available at <http://dnr.wi.gov/org/caer/cea/assistance/aquaculture/index.htm>.

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